

CLAIMS

1. An antenna comprising: a substrate including a ground electrode of a substantially rectangular shape; a feeding radiation element including feeding means and including a radiation electrode inside or outside a dielectric substance; a first non-feeding radiation element electrically connected to the ground electrode and including a radiation electrode inside or outside a dielectric substance; and a second non-feeding radiation element electrically connected to the ground electrode and including a radiation electrode inside or outside a dielectric substance,

wherein the feeding radiation element is disposed on the ground electrode such that a face of the radiation electrode of the feeding radiation element is substantially parallel to a face of the ground electrode and such that the feeding radiation element is disposed in the vicinity of a predetermined side of four peripheral sides of the ground electrode,

wherein the first non-feeding radiation element is disposed on the ground electrode such that a face of the radiation electrode is substantially parallel to the face of the ground electrode and such that the first non-feeding radiation element is disposed next to the feeding radiation element so as to be in the vicinity of the predetermined side, and

wherein the second non-feeding radiation element is disposed such that the second non-feeding radiation element is adjacent to both the feeding radiation element and the first non-feeding

radiation element and such that at least part of the second non-feeding radiation element projects outside the ground electrode from the predetermined side.

2. The antenna according to Claim 1, wherein the second non-feeding radiation element is electrically connected at substantially a central position of the predetermined side of the ground electrode.

3. The antenna according to Claim 1 or 2, wherein a resonance due to the second non-feeding radiation element is assigned to a higher frequency side or a lower frequency side of a multiple resonance due to the feeding radiation element and the first non-feeding radiation element to produce a triple resonance.

4. The antenna according to Claim 1 or 2, wherein a resonance due to the second non-feeding radiation element is assigned to a higher frequency side or a lower frequency side of a multiple resonance due to a harmonic wave of the feeding radiation element and a harmonic wave of the first non-feeding radiation element to produce a triple resonance.

5. The antenna according to any one of Claims 1 to 4, wherein:
the ground electrode is formed of a conductor pattern that is provided on the substrate and that has a substantially rectangular shape when viewed in plan;

the feeding radiation element and the first non-feeding radiation element are provided close to one of two shorter sides at ends in a longitudinal direction of the ground electrode; and

the second non-feeding radiation element is provided such that almost the entire second non-feeding radiation element projects outside the ground electrode from the side.

6. The antenna according to any one of Claims 1 to 5, wherein the radiation electrode of each of the feeding radiation element, the first non-feeding radiation element, and the second non-feeding radiation element is provided on a dielectric base member or within the dielectric base member.

7. The antenna according to Claim 6, wherein the feeding radiation element, the first non-feeding radiation element, and the second non-feeding radiation element are formed by insert molding or outsert molding using, as the dielectric base member, a dielectric material with thermoplastic resin.

8. The antenna according to any one of Claims 1 to 5, wherein the radiation electrode of each of the feeding radiation element and the first non-feeding radiation element is provided on a dielectric base member, and wherein the radiation electrode of the second non-feeding radiation element is provided on a dielectric base member that is different from the dielectric base member on which the radiation electrode of each of the feeding

radiation element and the first non-feeding radiation element is provided.

9. The antenna according to Claim 8, wherein:

the feeding radiation element and the first non-feeding radiation element are formed by insert molding or outsert molding using, as the dielectric base member, a dielectric material with thermoplastic resin; and

the second non-feeding radiation element is formed by insert molding or outsert molding using, as the different dielectric base member, a dielectric material with thermoplastic resin.

10. The antenna according to Claim 8 or 9, wherein the dielectric base member and the different dielectric base member have a fitting structure in which a fitting state is uniquely defined by fitting the dielectric base member to the different dielectric base member.

11. The antenna according to any one of Claims 1 to 10, wherein at least one of a chip capacitor and a chip inductor is installed in the middle of at least one of an electrical connection path between the radiation electrode and the ground electrode, an electrical connection path between the radiation electrode of the first non-feeding radiation element and the ground electrode, and an electrical connection path between the radiation electrode of the second non-feeding radiation element

and the ground electrode.

12. A portable radio communication apparatus comprising the antenna as set forth in any one of Claims 1 to 11.